A GUIDE TO MISSOURI'S

CAVE LIFE

by
William R. Elliott

MISSOURI DEPARTMENT OF CONSERVATION

70 Cave Species Brought to Light

Introduction

This guide fills a need for a field identification manual and introduction to the typical cave life of Missouri. It will be useful throughout the Ozark Region and adjacent states, where many of the same species or genera occur. The audience for this guide includes cavers, naturalists, cave guides, teachers and experienced students. You may access this guide on the Biospeleology web site at http://www.utexas.edu/depts/tnhc/.www/biospeleology. The Missouri Department of Conservation also publishes other material on caves and karst.

About 900 species of animals are known from Missouri caves. In an Ozark cave you will encounter related species that look like some of the 70 images in this guide. Avoid making the subject fit the photo, and read the captions to see if the identification fits. Many small creatures have features that only an expert could identify on a preserved specimen.

Please do not handle wildlife unless you are a qualified biologist. Do not remove wildlife from a cave except under a Missouri Wildlife Collector's Permit, including small invertebrates, even for educational use. The permit is available from the Missouri Department of Conservation. Do not handle wild mammals, as they may harbor communicable diseases. Rabies occurs at low rates in bats, and is more common in skunks, but wild mammals, especially carnivores, should only be handled when necessary by those who have been vaccinated against rabies.

Avoid close examination and photography of bats unless it is necessary for a scientific study. Lights, noise and body heat are disturbing to bats, and may cause them to wake up from hibernation and expend too much of their fat reserves, which they need to survive the winter. Summer bat colonies often flee from intruders, dropping their young, which they cannot retrieve from the ground.

Do not enter a cave without the permisson of the owner, and obey signs posted there. It is unlawful to dig in a cave without a permit, or to tamper with or bypass a cave gate or fence. Safety requires each caver to have a helmet with a chinstrap and a headlamp, two backup light sources, sturdy lace-up boots with gripping soles and gloves. Optional equipment includes knee and elbow pads and special insulation. Contact the Missouri Department of Conservation's cave biologist, or your closest National Speleological Society "grotto" (club) for further information.

Unless otherwise noted, photos are by William R. Elliott, cave biologist for the Missouri Department of Conservation. Many thanks to James E. Gardner, Jim Rathert, David C. Ashley, Lawrence Ireland, Tom Johnson, Harry Harnish, Rick Thom, Roman Kenk and Greg Stone for the use of their photos and A.J. Hendershott, Horton H. Hobbs III and William L. Pflieger for their illustrations. I am grateful to Mike Slay and Patrick Kipp, who assisted me in this project.

Note: This booklet uses the metric system throughout. There are 25.4 mm (2.54 cm) per inch, so a 75-mm salamander is about 3 inches long.

SB= stygobite (aquatic troglobite)
TB = troglobite
PB = phreatobite
SP = stygophile
TP = troglophile
SX = stygoxene
TX = trogloxene
Please see the glossary for definitions of these terms.

Contents

Grotto Salamander (front cover)

Typhlotriton spelaeus in Tumbling Creek Cave, Taney County, Missouri. This individual is equally at home in water or on a damp floor. Adults range from 75-120 mm. Note the skin growing over the eyes and the absence of gills in the adult.

Jim Rathert

Ozark Cavefish

Amblyopsis rosae (Eigenmann), SB: Known from about 41 localities in Barry, Christian, Greene, Jasper, Lawrence, Newton and Stone counties, and adjacent parts of Oklahoma and Arkansas. Length up to 56 mm. Listed as endangered by the Missouri Department of Conservation, and threatened by the U.S. Fish & Wildlife Service.

Jim Rathert

Southern Cavefish

Typhlichthys subterraneus Girard, SB: Known from about 24 localities in Camden, Carter, Dent, Howell, Laclede, Oregon, Phelps, Ripley, Shannon and Wayne counties, this cavefish cannot be distinguished easily from the Ozark cavefish, which occurs to the west. Length up to 105 mm.

James E. Gardner

Banded Sculpin

Cottus carolinae, TX: Sometimes found in caves, but usually in a starving condition. Up to 130 mm.

A.J. Hendershott

Grotto Sculpin

Cottus sp., SB: This small fish from Perry County caves is a unique form that has evolved from the banded sculpin, but it has varying reductions in eye size, pigmentation and pelvic fin ray number.

Young *Eurycea* Salamander Larvae

David C. Ashley

These 20-mm larvae in Mushroom Cave, Meramec State Park, are difficult to distinguish from *Typhlotriton* (grotto salamander) larvae of the same age. *Typhlotriton* has 16-19 costal grooves while *Eurycea* larvae have 13-15. The snout is more rounded and blunt than in *Typhlotriton*.

Western Slimy Salamander

David C. Ashley

Plethodon albagula or *glutinosus*, TX: There may be more than one species of "slimy salamander" in Missouri. Most are black with silver or white flecks on the side. The chin and belly are dark gray and they feel slimy when touched. Length 122-172 mm.

Cave Salamander

Eurycea lucifuga Rafinesque, TP: They prefer stream caves, primarily in the twilight zone, but they are also found in damp habitats outside caves. Length 100-177 mm. This species has variable coloration, with dark or depigmented patches in some individuals. A few populations have longer tails, similar to the long-tailed salamander.

Tom Johnson

Long-tailed Salamander

Eurycea longicauda longicauda (Green), TP: Limited to southeastern Missouri and farther east, this yellowish form usually has vertical bars on the sides and tail (more distinct on the tail). Length 102-159 mm.

Long-tailed Salamander

Eurycea longicauda, from Shannon County, TP: Populations in the transition zone from St. Louis to Shannon and Oregon counties have various patterns. This individual is not dark-sided but neither is it distinctly the *longicauda* subspecies.

Dark-sided Salamander

Eurycea longicauda melanopleura (Cope), TP: Probably the most common salamander in Missouri caves, this subspecies is yellowish-green to yellowish-brown with dark pigment along the sides. It is a bit more aquatic than the cave salamander, and it feeds more on aquatic invertebrates. Found mostly west of the transition zone. Length 102-159 mm.

Tom Johnson

Ozark Salamander

Plethodon angusticlavius Grobman, TP: Slender species with a narrow, somewhat lobed mid-dorsal stripe, widest between the hind legs, with irregular or wavy edges ranging from yellow to orange or red. Some lack a dorsal stripe. Sides dark gray to brownish-gray; belly has white and black mottling. Length 60-98 mm. Sometimes called the Ozark zigzag salamander. Southwestern Missouri; may be common in caves.

Tom Johnson

Southern Redback Salamander

Plethodon serratus Grobman, TP: Similar to the Ozark salamander, but their ranges do not overlap. Narrow, red or orange mid-dorsal stripe with saw-toothed edges. Sides are brownish-gray with some red pigment; belly has gray mottling. Central and eastern Missouri; common in caves. Length 81-105 mm.

Grotto Salamander

Typhlotriton spelaeus Stejneger, SB: Older larva, 50-120 mm long. As the animal matures its eyes and pigment regress. Some larvae are larger than adults, up to 90-120 mm long. Note the external gills along each side of the head. See adult pictured on cover.

Pickerel Frog

Rana palustris LeConte, TX: The only Missouri frog to use caves regularly and in large numbers. Uses wet caves as refuges from both hot and cold weather; eats a variety of arthropods, but probably does not prey much within caves. Often emaciated by springtime. Length 44-80 mm. Distinguished from other *Rana* species by 1) parallel rows of squarish or rectangular spots on the back, 2) distinct cream, yellow or golden dorsolateral fold and 3) bright yellow color on the underside of hind legs and groin area.

Green Frog

Rana clamitans Latreille, TX: Often a bronze color within caves due to lack of sunlight, 57-89 mm. Less common in caves than Pickerel frogs. Distinguished from other *Rana* species by dorsolateral fold that extends only to midbody.

Tom Johnson

Northern Spring Peeper

Pseudacris crucifer crucifer (Wied), TX: Reported from seven caves in Missouri but probably more common, this small, slender frog has a dark to faint X-shaped mark on the back; color varies from pink to gray; length 19-32 mm.

Dwarf American Toad

Bufo americanus charlesmithi Bragg, TX: Generally smaller than the American toad, this subspecies occurs in southern Missouri. About 50 mm with kidney-shaped parotid glands behind the eyes and distinct bumps (warts) on the back. Twilight zone.

James E. Gardner

Eastern Phoebe

Sayornis phoebe (Latham): Many entrances have old nests. Young birds are often found in spring in nests on entrance ledges.

James E. Gardner

Turkey Vulture Chicks

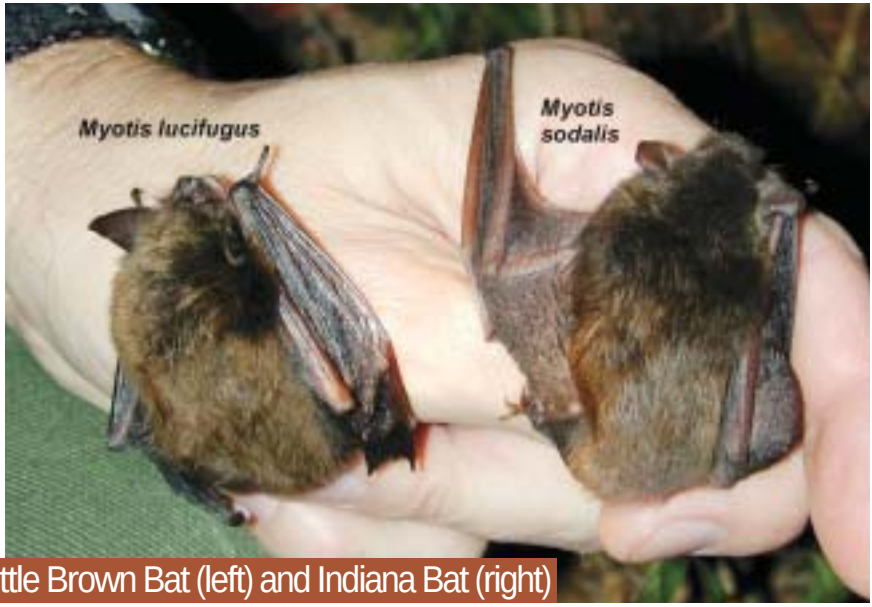
Cathartes aura, TX: Rough-winged swallows, cliff swallows, owls and other birds also rear young in cave entrances in the spring and should not be disturbed.

Eastern Pipistrelle

Pipistrellus subflavus (Cuvier), TX: The most commonly seen cave bat in Missouri. Wingspan 21-26 cm, forearm 31-35 mm, weight 6-8 g. A small bat with tricolored pelage (fur), blonde to medium brown, often with dew, the wing skin is almost black, and the forearms usually are pink. The tip of the tragus in the ear is rounded, unlike most *Myotis* in which it is pointed. "Pips" live in most of our caves, where they prefer to roost singly in the dark zone.

Big Brown Bat

Eptesicus fuscus (de Beauvois), TX: Wingspan 32-40 cm, forearm 42-51 mm, weight 14-21 g. A large bat with long, wavy, chestnut fur, a broad, dark muzzle and broad tragus. Hibernates near chilly entrances in winter, singly and sometimes in small clusters, but often moves. Often uses buildings and bat houses in summer.



Little Brown Bat (left) and Indiana Bat (right)

Little brown and Indiana bats look almost alike. *Myotis lucifugus* (LeConte), TX, wingspan 22-27 cm, forearm 34-41 mm, weight 7-14 g, is closely related to the Indiana bat. The Little brown has medium to dark brown fur; belly fur distinctly lighter than back; dark forearms with chocolate brown wing membrane; fur and membranes glossy; fur sometimes covered with condensation. Common throughout its range, hibernates in caves. May roost singly, in pairs or in clusters of a dozen or more bats; likes attics in summer. The Indiana bat has a softer, duller look.

Indiana Bat

Myotis sodalis Miller and Allen, TX: Wingspan 24-28 cm, forearm 35-41 mm, weight 6-9 g. An endangered species. Pink nose sort of flattened; fur dark gray or brown with a soft, dull, frizzy quality; belly fur somewhat lighter than back fur. Indianas have a small keel on the edge of the membrane next to the ankle, not normally visible.

Hibernating Indiana Bats

Indiana bats usually hibernate in clusters but may roost singly. They form large, dense clusters of 300-400 per square foot, sometimes thousands at a time. Recorded from about 60 Missouri caves, but now limited to about 20 cold-air-trap caves. Vulnerable to disturbance during hibernation. Not in caves in summer.

Gray Bats

Myotis grisescens (Howell), TX: Wingspan 27-32 cm, forearm 40-46 mm, weight 8-11 g. Fur uniform medium gray, but bleaches to reddish by spring and early summer. Uses caves year 'round, forms looser clusters than Indiana bats, often with wings unfolded, about 170 per square foot. Summer colonies form in warm caves in river valleys or near lakes, making large guano mounds. Highly vulnerable to disturbance during all seasons.

Bat Stains

Bat stains in an abandoned Gray bat maternity roost. Looters disturbed the colony when they breached the cave gate to dig up artifacts. Gray bats, though endangered, still have the largest colonies in Missouri and are the only species likely to leave large guano piles and extensive ceiling stains.

Hibernating Gray Bats

Hibernating gray bats, *Myotis grisescens*, often form long strings instead of compact clusters. Their habit of hanging upon other bats produces multiple layers in some clusters. Hibernates in very large numbers in only a few cold-air-trap caves.

Northern Long-eared Bat

Myotis septentrionalis (Trouessart), TX: Wingspan 23-27 cm, forearm 32-39 mm, ears 17-19 mm, weight 6-9 g. Formerly called "Keen's bat," this species has long ears, but only half as long as a Big-eared bat's. Often roosts solitarily but sometimes hibernates in small clusters of five or 10; frequently tucked into holes in ceilings or tight crevices in formations.

Eastern Small-footed Bat

Myotis leibii (Audubon and Bachman): 47 mm male found under leaves in Reynolds County. This bat sometimes roosts under rocks in caves and mines.

Eastern Red Bat

Lasiurus borealis (Muller), TX: Wingspan 28-33 cm, forearm 35-45 mm, weight 9-15 g. Red bats inhabit trees and usually hang by one foot to mimic a leaf. They swarm at some cave entrances in autumn for mating. They bear two to four young in the spring. Occasionally they may wander far into a cave. This individual died, but was still hanging by one foot in the Bat Graveyard of Great Spirit Cave, Pulaski County.

Greg Stone

Beaver

Castor canadensis, in the dark zone of Prairie Hollow Cave, Camden County. Beavers often penetrate caves along rivers in Missouri, and their nests harbor various invertebrates.

Sphalloplana evaginata

Sphalloplana evaginata Kenk, SB: A blind planarian from Berome Moore Cave, Perry County, up to 30 mm long and pinkish. *Sphalloplana hubrichti* lives in a spring and a cave in Jefferson and Ste. Genevieve counties. New species of *Sphalloplana* probably exist in Missouri.

Roman Keuk

Pink Planarian

Macrocotyla glandulosa, known only from Devil's Icebox Cave, Boone County. SB: Up to 30 mm. *Macrocotyla lewisi* occurs in three caves in Perry County. *Macrocotyla* and *Sphalloplana* are difficult to tell apart in the field.

Horsehair Worm

Gordius sp.: A gordian worm or nematomorph, about 20 cm long, is the free-living adult form of the parasite that lives in camel crickets. The adult escapes from a blister on the side of the cricket and lives in pools. Crickets are re-infected from ingesting the eggs while drinking the water.

David C. Ashley

Fontigens aldrichi

Fontigens aldrichi (Call and Beecher), SP: This tiny cavesnail (<2 mm) probably is overlooked in many caves and springs, where it is found under submerged rocks or rotting leaves and wood. Usually there is little organic detritus in streams where these snails are found. Five hydrobiid snails are found in Missouri: Three *Fontigens*, *Amnicola stygia* and *Antrobia culveri*; the latter is unique to Tumbling Creek Cave.

James E. Gardner

Inflectarius inflectus

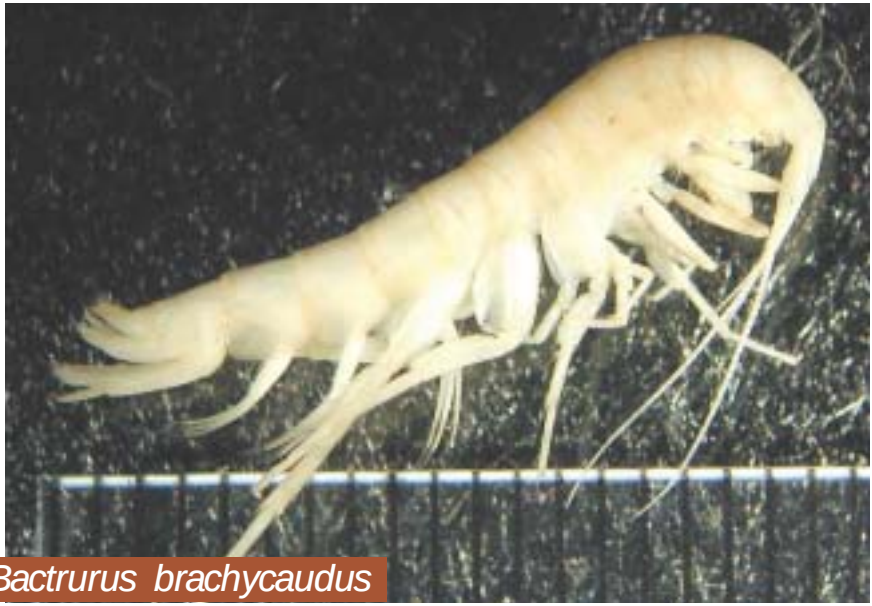
Inflectarius inflectus (Say), TP: A terrestrial, polygyrid snail, about 5 mm, known from a wide variety of habitats in all cave zones. Formerly known as *Mesodon*, it is most often found in leaf litter and is also known from Illinois, Kentucky and Alabama.

Crangonyx forbesi

Crangonyx forbesi Hubricht and Mackin, SP: A common stygophile, about 17 mm, this eyed and pigmented amphipod is known from a wide variety of microhabitats, including riffles and pools of streams, rimstone pools and drip pools in all cave zones, and from surface springs. This aggregation, from Lone Hill Onyx Cave, Franklin County, may exhibit reproductive behavior. Widespread in the Midwest.

Stygobromus ozarkensis

Stygobromus ozarkensis (Holsinger), SB: A blind amphipod, about 13 mm, found in the Springfield Plateau of southwestern Missouri and adjacent parts of Arkansas and Oklahoma. Photo from Tumbling Creek Cave, Taney County. Perhaps 10 species of *Stygobromus* are known from Missouri caves, springs and wells. About 200 species, all subterranean, occur in the Northern Hemisphere.



Bactrurus brachycaudus

Bactrurus brachycaudus Hubricht and Mackin, PB: At 19-30 mm long, the largest freshwater amphipod in North America occurs in caves, springs and wells in Missouri and Illinois. Three species of *Bactrurus* occur in subterranean Missouri.

James E. Gardner

Allocrangonyx hubrichti

Allocrangonyx hubrichti Holsinger, SB: Male, 15 mm long, a rare species of concern in Missouri. Formerly called the Central Missouri cave amphipod, this species was reported from a well in Arkansas in 2000 and was renamed Hubricht's long-tailed amphipod, referring to the long third uropods in the male.

Caecidotea sp.

Caecidotea sp., SB: An aquatic isopod about 20 mm long. Missouri caves have at least 16 species of *Caecidotea*, a widely distributed subterranean genus in North America.

James E. Gardner

Lirceus sp.

Lirceus sp., SP or SX: An aquatic isopod about 10 mm long from Hercules Lookout Cave, Taney County. This eyed species has been collected from riffles and pools of streams, isolated pools with muddy bottoms and deep rimstone pools, in all zones. Although Hubricht and Mackin (1949) reported five species of *Lirceus* from Missouri, only two species may be distinguished at this time.

Lawrence Ireland

Trichoniscid Isopod

Unidentified trichoniscid isopod, about 5 mm. A troglobitic *Amerigoniscus* has been found in Tumbling Creek Cave, Taney County, and troglophilic *Miktoniscus* and *Haplopthalmus* are found in rotting wood and soil. Some trichoniscids are amphibious. Note the conical uropods on the posterior, characteristic of trichoniscids.

James E. Gardner

Pillbugs

Armadillidium vulgare (Latreille), TX: Pillbug isopods, 5-10 mm long, rolling up. This introduced species is in several states. It occurs in the loose soil, leaves, sticks and feces of turkey vulture nests and far from cave entrances in total darkness. Softer, pale "sowbugs," such as *Cyclisticus* (TP), *Metoponorthus* (TX) and *Porcellio* (TX), may be found in dung and detritus.

Bristly Cave Crayfish

Rick Thom

Cambarus setosus Faxon, SB: Adults 53-119 mm long. Known from about 46 caves, springs and wells in a nine-county area on the Springfield Plateau, and a few sites in northeastern Oklahoma and northern Arkansas. This species has small, unpigmented eyes, and it can respond to light. The setae on the pincers are long and bristly. A species of concern in Missouri.

Salem Cave Crayfish

James E. Gardner

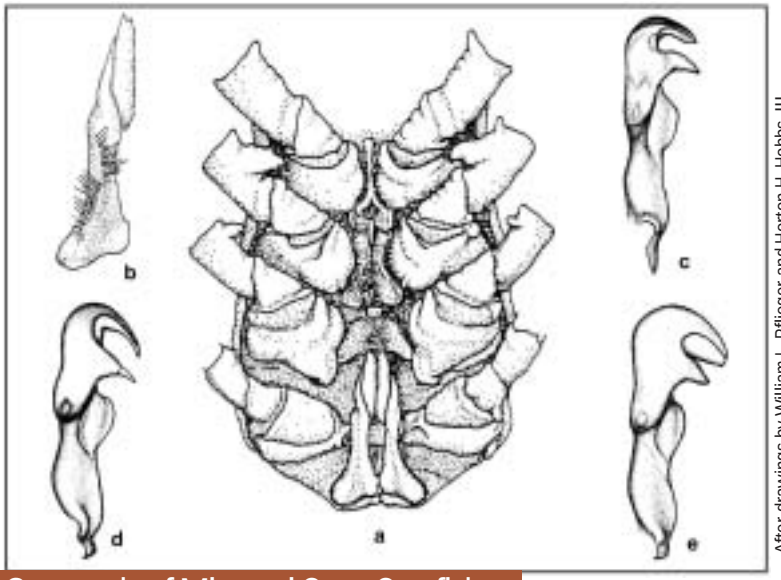
Cambarus hubrichti Hobbs, SB: Adults 58-94 mm long. It has short, inconspicuous setae on the pincers; and other small differences. East-central Ozarks of Missouri, from about 22 caves and springs from Camden and Crawford counties south to Howell and Ripley. Responds to light and vibrations. A species of concern in Missouri.

Caney Mountain Cave Crayfish

Orconectes stygocaneyi Hobbs, SB: Adults 84-104 mm. This species, discovered in 1999, is known only from one cave in the Caney Mountain Natural Area, Ozark County. The small, vulnerable population is protected and periodically checked by biologists. It is closely related to *O. pellucidus*, the Mammoth Cave crayfish, and is the first stygobitic *Orconectes* found west of the Mississippi River.

Spothanded Crayfish

Orconectes punctimanus (Creaser), TX: Adults 32-110 mm long. A pair of crayfish mating in a cave stream. This eyed species likes to wander upstream into caves.



After drawings by William L. Pflieger and Horton H. Hobbs, III

Male Gonopods of Missouri Cave Crayfishes

Male gonopods of Missouri cave crayfishes: a) Ventral view of gonopods between posterior walking legs, *Orconectes stygocaneyi*. b) Form I (mature), *O. stygocaneyi*, right gonopod, ventral view. c) Form I, *Cambarus hubrichti*. d) Form I, *Cambarus setosus*. e) Form II (immature) gonopod, *C. setosus*. Form II usually cannot be identified to species.

Meta ovalis

Meta ovalis Gertsch, TP: The spider (8-10 mm) is guarding its egg sac. It is a widespread species in caves and cavelike habitats in the eastern United States. Formerly *Meta menardii*.

Fishing Spider

Dolomedes sp., TP: A fishing spider, commonly found in entrance rooms or near water. Body 7-26 mm.

Daddy Longlegs

Leiobunum sp., TX: Daddy longlegs (harvestmen) cluster in dark, moist places near the entrance. They leave the cave at night to feed on feces, carrion and sometimes aphids. They are not spiders, but opilionids—arachnids with a fused body form and no silk or venom glands. They emit a defensive odor when disturbed, are nonvenomous and their chelicerae (mouthparts) are too small to inflict a bite. Four species of *Leiobunum* have been found in Missouri caves. Other harvestmen may have shorter legs and spiny pedipalps (arm-like appendages) for taking small insects.

James E. Gardner

Pseudoscorpions

Pseudoscorpions of several families may be found in caves, such as the stocky little chernetids, genus *Hesperochernes*, which are trogloxenes and troglophiles in bat guano, dung, or wood rat nests, or rarely slender troglobites from other families. Pseudoscorpions prey on small arthropods. Sizes range from 2-5 mm.

David C. Ashley

Tingupa pallida

Tingua pallida Loomis, a conotylid cave millipede, TB: Usually collected from leaf litter and wet rotting wood in total darkness. Considered a troglobite in Missouri, may have been collected from leaf litter in Illinois. Length 5-10 mm. Millipedes feed on fungi and bacteria, have two pairs of legs on most body segments and are more common in caves than centipedes, which are predators with one pair of legs per segment.

Causeyella dendropus

Causeyella dendropus a trichopetalid cave millipede, TB: From Tumbling Creek Cave, Taney County. Known from fewer than 10 caves, often found on rotten wood like the more common millipede *Tingupa pallida*, but rarely in the same cave. Note the long setae. Length 5-10 mm.

Narceus americanus

Narceus americanus (Beauvois), TX: A large (about 50 mm) spirobolid millipede hibernating on the ceiling in Big Barn Hollow Cave, Texas County. Specimens seen in entrances, twilight and total darkness. It often overwinters in caves.

Springtails

Family Onychiuridae, about 1 mm long, sitting on the surface of a small drip pool, TP: Up to 62 species of Collembola—small, hopping insects—inhabit Missouri caves. About 31 are troglophiles, seven are troglobites, five are trogloxenes and 19 are accidentals. The most common genus is *Pseudosinella*, Family Entomobryidae.

James E. Gardner

Campodeid dipluran

Campodeid dipluran TB: About 10 mm long, this primitive, eyeless, wingless insect with two tails may also be found in soil, where it would be termed an edaphobite.

Camel Cricket

Ceuthophilus gracilipes Hubbell, TX: A female camel cricket (on ceiling) can be identified by her long, swordlike ovipositor between the hind legs, used for laying eggs. Males lack such a structure.

Camel Cricket (molting)

Ceuthophilus gracilipes Hubbell, TX: A camel cricket molts in Round Spring Cavern, Shannon County. This is the most common species of five *Ceuthophilus* in Missouri caves.

James E. Gardner

Rove or Staphylinid Beetle

Rove or staphylinid beetles are common inhabitants of dung, carrion and organic detritus. Fifty species are known from Missouri caves and most are troglophiles. *Aleochara*, *Atheta*, *Philonthus* and *Quedius* are common genera. Photo of *Sepidophilus littorinus*, about 10 mm.

Ground Beetle

Ground beetle, about 20 mm, TP: Carabid (ground) beetles are predators. Two species of *Xenotrechus* are troglobites from four caves in eastern Missouri (Jefferson and Ste. Genevieve counties).

Ptomaphagus

Ptomaphagus beetles are common in American caves. This 7 mm *Ptomaphagus nevadicus* from California is similar to the troglophile *Ptomaphagus cavernicola*, which occurs in caves in the Ozarks, Iowa, Florida, Alabama, Texas and Mexico. Leiodid beetles usually are found in guano, fungi, wood, under carrion and scats.

Lawrence Ireland

Cave Webworm

Macrocera nobilis Johnson TP: The 10-20 mm larva of a fungus gnat spins webs for catching and eating prey, such as this millipede. Family Mycetophilidae. At least 19 families of Diptera (flies) are known from Missouri caves.

James E. Gardner

Amoebalaria defessa

Amoebalaria defessa (Osten Sacken), TX: This cave fly, Family Heleomyzidae, about 5 mm long, usually is found on the ceiling. It is a weak flier, but is sometimes attracted to a headlamp.

Herald Moth

Scoliopteryx libatrix (Linnaeus), TX: the Herald Moth or Scalloped Owlet Moth overwinters in caves in eastern and central Missouri. Family Noctuidae. Length about 20 mm.

Glossary of Biospeleology

See the Biospeleology web site for a longer glossary:
http://www.utexas.edu/depts/tnhc/.www/biospeleology

Antenna (plural antennae): A feeler; an appendage, sensory in function, in pairs on the heads of crustaceans, insects and certain other animals.

Appendage: An arm or other limb that branches from an animal's body.

Aquatic: Living in water. Aquatic cave animals include amphipods, isopods, crayfish, planarians, fish and blind salamanders. Marine refers to salt water.

Arthropods: Animals with jointed legs and hard exoskeletons. Includes insects, crustaceans, spiders, millipedes, etc.

Biospeleology: The scientific study of cave life, or the biology of caves, karst and groundwater. A biologist who specializes in this study is called a biospeleologist.

Carnivore: An animal that lives by eating the flesh of other animals. Or, a member of the Order Carnivora, such as dogs, cats, raccoons, bears, etc. See also Detritivore, Herbivore, Insectivore, Omnivore.

Community: All the plants and animals that live in a particular habitat and are bound together by food chains and other relationships.

Constant-temperature zone: The area of a cave where air temperature is relatively unchanging throughout the year and approximates the average annual temperature aboveground.

Crustaceans: The large class or subphylum of animals that includes lobsters, crayfish, amphipods, isopods and many similar forms. Crustaceans usually live in water and have many jointed, biramous appendages, segmented bodies and hard exoskeletons.

Decomposers: Living things, chiefly bacteria and fungi, that live by extracting energy from the decaying tissues of dead plants and animals.

Detritivore: An animal that feeds on organic detritus, such as dung, carrion, bacteria, fungi.

Ecology: The scientific study of the relationships of living things to one another and to their environment. A scientist who studies these relationships is an ecologist.

Edaphobite: A soil-dwelling animal. Some are found in caves.

Epigean: An adjective used to describe the surface environment (epigeum), as opposed to the subterranean (hypogean) environment.

Evolution: The process of natural consecutive modification in the inherited makeup of living things, and by which modern plants and animals have arisen from forms that lived in the past.

Exoskeleton: An external skeleton. The hard body covering or shell of most invertebrate animals, including insects, crayfish and millipedes.

Fossil: Any remains or traces of life from the prehistoric past, whether bone, cast, track, imprint, pollen or any other evidence of their existence.

Guano: Excrement, as of bats, crickets or sea birds. In certain bat caves and on islands colonized by sea birds, guano sometimes accumulates in such vast quantities that it is mined commercially for fertilizer.

Guanophile: Associated with guano, such as staphylinid beetles, springtails and some pseudoscorpions.

Habitat: The immediate surroundings (living place) of a plant or animal; everything necessary to life in a particular location except the organism itself. See Microhabitat.

Herbivore: An animal that eats plants, thus making the energy stored in plants available to carnivores. See also Carnivore; Detritivore; Insectivore; Omnivore.

Hibernaculum (plural hibernacula): The place where an animal hibernates.

Hypogean: An adjective used to describe the subterranean environment (hypogeum), as opposed to the surface (epigean) environment.

Insectivore: An animal that feeds on insects. Almost all species of North American bats (Order Chiroptera) are insectivores. Or, the Order Insectivora (shrews). See also Carnivore; Herbivore; Omnivore.

Invertebrate: An animal, such as a planarian, snail or crayfish, without a backbone. See also Vertebrate.

Karst: A solutional landscape marked by caves, sinkholes, losing streams, springs, natural bridges and other features. Usually in limestone, dolomite or gypsum.

Larva (plural larvae): An immature stage in an animal's life history when its form usually differs from the adult form, such as the tadpole stage in the life history of a frog. See also Metamorphosis.

Lateral line system: A series of sensory organs, usually appearing in a line or series of lines on the sides and heads of fishes and larval amphibians. Used to sense vibrations in the water.

Metamorphosis: A change in the form of a living thing as it matures, especially the transformation from a larva to an adult.

Microclimate: "Little climate." The environmental conditions, such as temperature, humidity and air movement, in a very restricted area.

Microhabitat: A miniature habitat within a larger one; a restricted area where environmental conditions differ from those in the surrounding area.

Omnivore: An animal that habitually eats both plants and animals. See also Carnivore; Detritivore; Herbivore; Insectivore.

Parietal fauna: Pertaining to the inhabitants on the walls of the entrance and twilight zones of a cave.

Phreatobite: An inhabitant of groundwater, often exhibiting troglomorphy, but not limited to karst systems. Many examples of amphipods and other crustaceans abound.

Predator: An animal that lives by capturing other animals for food.

Prey: A living animal that is captured for food by another animal.

Scats: Animal droppings or dung, an important source of food in caves.

Scavenger: An animal that eats the dead remains and wastes of other animals and plants.

Setae: Hairs on various types of arthropods.

Species (singular or plural): A group of plants or animals whose members breed naturally only with each other and resemble each other more closely than they resemble members of any similar group.

Stygobite: An aquatic troglobite. From "Styx," a subterranean river on the way to Hades in Greek mythology.

Stygophile: An aquatic troglophile.

Stygoxene: An aquatic trogloxene.

Terrestrial: Living on land. Not to be confused with "epigean." Terrestrial cave animals include beetles, millipedes, spiders, bats and crickets. See also Aquatic.

Troglobite or troglobiont: "Cave dweller." An animal that lives in caves and nowhere else.

Troglodyte: A cave man. Sometimes used incorrectly for a cave animal.

Troglomorphy: The physical characteristics of a troglobite or stygobite; e.g., reduced eyes and pigment, elongated appendages, well-developed tactile and olfactory organs, etc.

Troglophile: "Cave lover." An animal that can complete its life cycle in caves but may also do so in suitable habitats outside caves.

Trogloxene: "Cave visitor." An animal that habitually enters caves but must return periodically to the surface for some of its living requirements, usually food.

Harry Harnish

Ozark Big-eared Bats

Corynorhinus townsendii ingens Handley, TX: Wingspan 30-32 cm, forearm 39-48 mm, ears 33-38 mm, weight 8-14 g. Besides the huge ears, the nose has lumps on either side, and the fur is brown with tan belly. This endangered subspecies has not been confirmed in Missouri since 1971, but still lives in Arkansas and Oklahoma. A similar species, Rafinesque's big-eared bat, is gray with a whitish belly and rarely is found in caves. In hibernation the ears are often rolled up like rams' horns to conserve heat. Photo from a cave in Devil's Den State Park, Arkansas.

NAT 012

Design by Patrick Kipp